

## **Cybersecurity in Industry 4.0: edge computing and deep AI for global data analysis.**

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Industry 4.0 is a revolutionary concept that is helping to change the industry by digitizing its production processes and increasing its productivity. Internet connectivity lies in the very core of Industry 4.0 [1-32]; it enables us to connect all the devices within a factory, creating a fully connected system that collects data and employs artificial intelligence algorithms to analyze them. With the fourth industrial revolution, the need for manpower in factories will become lower, while industrial processes will become more efficient. Artificial Intelligence (AI) is the driving force behind global development and it is therefore an extremely topical subject. The ever-greater developments in the field of artificial intelligence have sparked many debates about its role in different sectors (society, business, government, etc). AI began as a fantasy about the future but now we truly have everything we need to make it a reality; computing power, storage capacity, communications technology and qualified manpower [33-70]. We can optimize our industry by incorporating AI into its production processes. However, it is important to bring Blockchain into Industry 4.0, due to its countless advantages. Blockchain is essentially a form of ledger keeping that makes data unalterable and indestructible. Although it is commonly thought of as the technology behind different cryptocurrencies, such as bitcoin and ether, Blockchain can be used to secure anything, including manufacturing processes; by preserving the integrity of data, it prevents cyber-attacks and increases security [71-116].

Edge Computing is another, highly relevant technology for Industry 4.0. It streamlines the traffic coming from IoT devices and provides real-time local data analysis. Instead of a centralized data-processing system, the EC paradigm processes the data at the edge, that is, as close to the source of data as possible [117-140]. Thus, the sensors and smart applications/devices deployed in a factory can process the data in real time; as soon as they are generated. Thus, Edge computing accelerates data-streaming and eliminates latency. Moreover, it reduces Internet bandwidth usage, eliminating costs and ensuring that applications operate correctly in remote locations; this is an important aspect for factories. The ability to process data without ever storing it in a public cloud is another layer of security, nevertheless, the edge must also be protected against cyber-attacks [141-174].

To sum up, AI, blockchain and edge computing must all be encompassed within the Industry 4.0 concept. These three technologies are allies and complement each other. AI models and blockchain-based distributed systems should be adapted to satisfy the needs of Industrial IoT; this will provide some alternatives for the merging of these three technologies [175-208]. Security, reliability, rigorous time response and smart solutions are the elements that characterize our modern factories and production centers. To build more efficient and productive systems, it is necessary to integrate those technologies and actively counteract potential cyber-security risks.

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